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ABSTRACT

In this report three administrators explore the challenges of integrating technology into the mainstream of academic life especially at the State University of New York (SUNY). Frederic V. Salerno, in "Pedagogy is the Traveller on the Educational Superhighway," asks how technology can be integrated into academic life and sees the answer in an educational superhighway. In "SUNY's New Challenge and Choice: Instructional Technology--Old Byway or Superhighway?" Joseph C. Burke raises four issues: career skills, different types of students, public distrust, and new competitors. Technology is seen as the way to transform teaching methods and how students learn. The third paper, by James W. Hall, "The Revolution in Electronic Technology and the Modern University: The Convergence of Means," notes that technology and the increasing demand for postsecondary education are causing fundamental changes in how universities function as institutions of higher learning. Although distance education is one response to these changes, convergence, a concept that visualizes the university as a place of wide access, of multiplicity and replicability of resources, of limitless exchange and interconnection, is seen as the preferred road. To test these theories in the SUNY system, three objectives are defined: installation of a statewide information network, reconceptualizing how technology is being used, and converging instructional modes. But irrespective of any changes, the university must continue to maintain its central values. (CH)

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STATE UNIVERSITY OF NEW YORK

THE CHALLENGE OF TECHNOLOGY TO HIGHER EDUCATION

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The Challenge of Technology to Higher Education

Pedagogy is the Traveller on the Educational Superhighway

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SUNY's New Challenge and Choice: Instructional Technology — Old Byway or Superhighway?

Joseph C. Burke
Interim Chancellor
State University of New York

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The Revolution in Electronic Technology and the Modern University: The Convergence of Means

James W. Hall
Vice Chancellor for Educational Technology
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OCTOBER 1994

Pedagogy is the Traveller on the Educational Superhighway

◆ Frederic V. Salerno

Integrating technology into the mainstream of academic life is of the utmost importance to all of higher education. And when we look at recent developments in technology, the possibilities seem endless.

Twenty years ago, one computer was big enough to fill this room wall-to-wall, but only had 64K of memory. Today, I carry a pocket computer the size of a notepad that is twenty times more powerful than its room-sized ancestor.

And what was a desk-size computer yesterday, now sits on top of one.

I recently read that all the calculations that took one year to complete, working around the clock, back in 1945, could be accomplished today by a single undergraduate student in one afternoon using a PC.

The technology that can help us accomplish such feats is awe-inspiring and complex.

But we should reserve some of that awe for ourselves. Because no technology is as complex as each one of us — the human brain is still the most subtle, complicated structure in the known universe.

The human brain is subtle and complicated enough to coordinate the fingers of a concert pianist; ingenious enough to create three-dimensional landscapes from light that falls on two-dimensional retinas; and complex enough to paint a picture so finely rendered that even a computer cannot reproduce it.

As anyone who has worked with artificial intelligence can attest, the human brain cannot be replicated. It is what makes each of us a unique individual.

The Nobel Prize-winning scientist Gerald Edelman said, "The brain bears more resemblance to a rain forest than a computer ...the brain is a 'jungle' in its complexity." In comparing the two, he said that "computer codes cannot match the human abilities of language, imagination, and metaphor and cannot imitate our sense of individuality."

NYNEX's work in voice recognition has taught us how difficult it is to imitate human abilities. Through recent developments in technology and research, we now have computers that recognize some five- to six-thousand isolated spoken words.

But those computers cannot understand natural language — a language where words have double meanings and context is as important as content. As of yet, only human beings can make those distinctions.

Why am I stressing the wonder of the human mind? Because to me it is the essential difference between the art of teaching and the science of technology. The art of teaching, *and* administrating, cannot be replicated or replaced by the science of technology.

No matter what the computer Hal did in the movie *2001*, in reality no machine or technology can share insights about the Classics or opinions about the Crusades. Only human beings can do that. Technology can never replace the art of teaching; technology can only provide the platform.

Wordsworth said, "What we have loved, others will love, but we must teach them how." That is the university's job — to convey to its students a passion for learning. And it is a passion for life-long learning that is the university's most valuable legacy to its students.

So what can technology do for teaching?

If we see technology as what it is — a tool, or a platform, or one of the roads to learning — then it should only be used where it makes sense. We don't drive down a road unless it takes us somewhere; we don't need a platform unless we have something to build on it.

After all, students do not necessarily need technology to excel. Shakespeare never had a word-processor and Darwin never had a computer. But there is a good chance that if Shakespeare lived today he would be using a word-processor and Darwin would be using a computer.

This is true of poetry and science and most other professions that our students will be pursuing in the next decade.

In the U.S. today, 60 percent of all jobs are performed by "knowledge workers" — people whose livelihoods depend on the information they generate and receive. As we create jobs, eight out of ten will be in information sectors of our economy.

The question, then, is how can we best integrate into today's academic life the technological tools that students will need in tomorrow's careers? How can we put the university into a position of leadership in advanced educational technology?

It will take many creative, imaginative, unique minds to answer that question. I believe State University of New York is already well on its way. Despite severe budgetary constraints, we've made great strides toward transforming SUNY into one of the most advanced, technologically modern networks of campuses.

Today, nearly every campus has:

- A connection to SUNYNet and SUNYSAT;
- An automated library system on the SUNY network;
- Computing labs for students; and
- Teachers who use technology in the class.

Today, many of our campuses are already linked to the Internet. Academic and office buildings are connected as well — and can be reached both on and off campus.

We've got "smart classrooms" on many campuses equipped with computers, electronic displays, and telecommunications linkages.

Even many of our residence halls are connected to the network.

SUNY has a lot to be proud of — but I know we won't be satisfied until we reach our ultimate goal — of making this technology accessible to every one of our students and faculty members — so they can meet their educational as well as personal goals.

And that's crucial. As we enter a truly global era of competitiveness, the economic future of our nation will be defined by our ability to educate our students better than those in other countries.

I believe that in the U.S. today, we are uniquely positioned to do just that since we already have in place the most advanced communication system in the world.

How can we use this advanced communication technology as a tool to benefit our schools, our teachers, and our students? One way is to build an educational superhighway nationwide that projects the power of teaching.

We no longer have to teach just locally. We can use the superhighway to project beyond our current teaching boundaries. And I don't just mean physical boundaries.

Teaching has not changed dramatically in the last decade. Technology can now be the tool that can help teaching move itself into new territory — through distance learning, broader access to information, and interactive student experimentation.

I see each of these as having multiple benefits. For example, distance learning gives universities the ability to reach wider and more diverse audiences. This translates into larger appeal in the marketplace.

At the same time, distance learning can save universities money.

For example, what if an advanced Calculus course was being taught at the University at Stony Brook next semester — but it wasn't being taught at the College at Purchase — because the student body there was much smaller and not every course is offered every semester?

Students at Purchase would have to wait for another semester to take the course. And that might mean graduating in five years instead of four.

In the new distance-learning scenario, we could transmit the course electronically — from Stony Brook to students at Purchase, thereby enabling them to graduate on schedule, saving them time — and money — and freeing up SUNY resources for other students.

This is one scenario in which technology makes good sense and makes education more efficient.

SUNY's electronic library system provides multiple benefits, cutting down on shelf space, while giving students access to much more information by hooking them up to any SUNY campus — and eventually linking them to data bases all over the world.

This is the true beauty of the information superhighway — a highway that provides broader public access to a world of information.

Lastly, interactive learning models can provide multiple benefits, particularly in the teaching of math and science.

Students can experiment with radioactive materials and handle explosives with no risk to their own safety or the safety of the university, saving additional university insurance premiums!

I see all of these — distance learning, broader information access, and interactive experimentation — as just some of the ways that the tools of technology make good sense for all of higher education.

One of my favorite movies is *Deskset*, with Katherine Hepburn and Spencer Tracy. Tracy comes into the company where Hepburn is working. He is an efficiency expert accompanied by an enormous computer.

Everyone in the company believes that the computer is there to replace their jobs. It does accidentally print pink slips for everyone in the building, but Tracy clears it all up and makes the point that the computer was never meant to replace people, but to help them do their jobs more efficiently. He concludes by saying that their increased effectiveness will ultimately mean more jobs.

I believe the same will be true in education. Using technology as a delivery system will enlarge our audience, grow our student body, and thereby create the need for more teachers.

If we look at the lessons from other industries, we see that technology has enabled growth and expansion.

My own industry is a perfect example. New technologies have made this industry white hot. Growth in data communications and wireless communications have created enormous opportunities for companies domestically and internationally.

In 1983, AT&T predicted that fewer than 1 million people would be using cellular service by the year 2000. They were wrong. At the end of last year, there were already more than 16 million cellular users, with 14,000 signing up daily. And, current predictions are for well over 30 million by the year 2000.

In China today, there is about one phone for every 80 people. In the U.S. that ratio is about 1 to one and a half. To bring China to the same penetration levels as the U.S., we will need to double the number of phones in the entire world today.

And I believe you will see similar explosive growth in education as technology takes hold — and it will be the schools and universities that embrace technology early on. Those who are not afraid of the changes technology brings — will be the winners.

This is true in my industry. And for that reason, NYNEX is racing to build its own fiber network before our competition.

It is true of other industries as well. Companies like Wal-Mart, Home Depot, Toys R Us, and Kmart all embraced technology early. They came out ahead, and are still in the lead.

And this will be true for higher education — as it moves forward into a position of technological leadership and remains there.

JUNE 1994

SUNY's New Challenge and Choice: Instructional Technology — Old Byway or Superhighway?

◆ Joseph C. Burke

Twenty-five years ago while traveling in Spain, I visited the University of Salamanca. Some of the fame of this medieval university flows from a single lecture hall — the Theology Room — and from an event that occurred there over 700 years ago. One afternoon, the lecture of a Professor of Theology was disrupted when civil guards burst into the hall and carried him off to prison on orders from the Spanish Inquisition.

For 25 years, he languished in a dungeon, pressed constantly by grand inquisitors to confess to heresy. Then miraculously he was freed and scheduled to give a lecture the following day in the same hall. (This was long before sabbaticals.) People jammed the hall to hear what he would say about the evils of the Inquisition, about religious persecution, about the assault on academic freedom. A hush settled over the hall as this professor physically broken by 25 years of torture and torment hobbled to the podium. He looked at his notes and mumbled: "As I was saying."

This story speaks to the best and the worst of academia: timeless topics that are tarnished by no less timeless technologies. If our message in academia is often changeless, must our medium remain forever constant? Today, seven centuries later, tens of thousands of faculty still stroll to the front of class — often to a podium — and repeat the opening words of our 13th century theologian: "As I was saying." The greatest difference is that many of today's professors must use microphones, for their classes are much larger and their students not as silent as those in the Middle Ages.

Higher education seems trapped in a time warp — in a pre-Gutenberg era. Much too often academics act as though instructional information must be mostly transmitted by word of mouth, at a time when technology is rushing down a superhighway toward a global village where information is instantly available on a worldwide web of databases.

Colleges and universities, the oldest corporation known to the human race, have a history of snobbishly surviving — largely unscathed — a series of technological revolutions: the printing press, the television, even the computer. Though these revolutions have transformed our culture and civilization, they have left our curricula and classrooms largely untouched. It is one of "Burke's laws" that the interest of academics in change is in direct proportion to its distance from our classrooms and our campuses.

The printing press made knowledge that was once the monopoly of the favored few accessible to all who could read. Books are now ubiquitous, yet lectures persist as the principal means of conveying instructional information to students on our campuses. Though faculty write the textbooks, many students do not read or buy them, for they expect the lectures to cover the material. And too many professors still insist on meeting such minimalist expectations.

The miracle of television has transformed American life but has left little imprint on higher education. The most visible vestiges of those grand plans of the late sixties for the tele-revolution in higher education are the rusty remnants of television sets that line the walls of the communication lecture halls found on every SUNY campus. They are subjects for study by cultural anthropologists rather than experts in instructional technology. Television never transformed the technology of instruction, though it did change dramatically the learning styles of generations of students nurtured more by images and pictures than by written or even spoken words.

Computers have changed life on campus, but they still have not disrupted the dominance of the lecture as the predominant mode of instruction. Faculty and students use them for their individual work, but they have had, to date, minimal collective impact on the curricula or on teaching techniques.

In the abstract of their presentation at a recent SUNY conference on Instructional Technologies, William Feigelman and Thomas Taylor of Nassau Community College comment on the immunity of classrooms to change: "Against the backdrop of these changes, it is remarkable that instruction in undergraduate introduction to sociology courses remains virtually unchanged from what it was 25 years ago."

What these faculty found in sociology classes is replicated by a recent faculty survey from the Higher Education Institute of UCLA. This survey shows that the lecture still rules supreme in American higher education. Nationally, faculty from public graduate and research universities indicate that only 12.1 percent of the undergraduates use some form of computer or machine-aided instruction in all or most of their classes. In SUNY's University Centers that figure falls to 7.7 percent. The national average for four-year public colleges is 15.7 percent, with SUNY's four-year campuses at 10.5 percent. Our two-year colleges, where 22.1 percent of the courses use new technologies in instruction, were closer to the national average of 24.0 percent. The differences between SUNY and its national peers suggest that our System trails the nation in changing its instructional technology, even though technology appears to have had only a marginal impact on teaching techniques in public colleges and universities throughout the country.

H. G. Wells once warned that the world faced a catastrophe and that the only hope was to win "the race between education and obsolescence." But catastrophe is certain if education — both higher and lower — becomes obsolete as it clings to a talking technology for teaching. We academics are in danger of letting the information highway bypass our campuses or at least

our classrooms. We seem to want this access for ourselves in our research but not for our teaching or for our students in our classrooms. I hope that students will not infer that the new technologies are needed for us but are unnecessary for them.

The new information technologies present a critical challenge to colleges and universities. And this time for several reasons we may not succeed or even survive if we ignore them. Other no less venerable institutions have come and gone; and in an era driven by novel ideas and innovations, age loses much of its aura and is hardly a guarantor of continued longevity.

The first reason for fear about success or survival is that the revolution in information technology is transforming the marketplace and career options. Knowledge and information have long been the keys to economic prosperity and career success, especially when that possession was certified by college or advanced degrees. But in an age when knowledge doubles every half decade, possession becomes impossible. In such a time, the secret to success is the ability to access easily the ever-expanding wealth of knowledge and information stored in complex networks that will remain unintelligible to the uninitiated. In this new era, the dividing line between the "haves" and the "have nots" — the advantaged and the disadvantaged — will be the ability to access information in these sophisticated worldwide networks. The leading educational institution will be the one that teaches not knowledge — as though it can be delivered in a defined period of time — but how to acquire, access, and analyze it throughout a lifetime. Colleges and universities will have to transform themselves to achieve this goal.

The second reason is that college students have changed. The students we teach today, and even more the students we will teach in the future, differ dramatically from those for whom the classic college curricula and faculty teaching techniques were developed. Higher education that once was the preserve of the favored few now educates in the United States over 50 percent of the high school graduates — and in New York State

that figure has soared to 75 percent. College degrees once needed only for the professions and the highest careers are becoming a requirement for all good jobs in a knowledge and information society.

Though our teaching technologies have hardly changed, the students we teach surely have. They are much more diverse in gender, culture, and ethnicity. They are older and often can attend classes only part time because they must work, often full time. The usual classes, meeting in daylight hours from eight to four where learning depends on attending lectures, do not fit well their different schedules or diverse learning styles.

As these so-called nontraditional students become the majority of those attending public colleges and universities, they are demanding that we meet their diverse needs rather than requiring them to accept what we choose to give them and when we choose to give it. As these students become the majority and as they see the numbers of potential students level or decline, they begin to think and act like consumers. They choose a college as they would any product they buy by looking at price, quality, and convenience. Most of all, they are interested in job skills and what they call relevance to the real world. They will soon recognize that the real world of the future will depend on technology and demand that we teach them the skills and knowledge to use it well.

These new attitudes jar us. We are accustomed to having students and society come to us. We possessed knowledge. If you wanted to know, you had to come to us. But the new technologies along with the new demographics are turning the tables on us. If technology can bring the best that the world offers in education to their homes, why do they want a warmed-over version that requires them to come to our campuses?

Clearly, the new student coupled with the new technology presents a new challenge to colleges and universities to change their curricula and teaching techniques.

The third reason that colleges and universities must change is that society and the states that fund us, along with our students, have become disenchanted with higher education. They decry the soaring costs and the declining quality of undergraduate education. They complain of our continuing cry for higher state support and student tuition despite our deplorable completion rates and the declining knowledge and skills displayed by our graduates. They accuse higher education of reneging on our promise to deliver simultaneously both access and quality. Access for the underprepared has led to more dropouts; and the quality of our graduates has declined. In the past, higher education could always count on the support of the public — society at large — when confronted with criticisms and challenges. Today's polls show that the public confidence in higher education has turned to cynicism. We should remember that this cynicism results from recognition that our graduates lack the writing and mathematical skills for today's jobs. What would be the reaction if the public realized that we are also failing to teach our graduates how to navigate the web of databases that will be essential to their success in a society dependent on one's ability to access information?

The fourth reason for responding to the revolution in information technology is the competitive challenge to our monopoly in granting degrees opened by the educational potential of the electronic superhighway. A recent report from the PEW Foundation sees this revolution in access to information as "the most powerful external challenge facing higher education, and the one the academy is least prepared to understand." This report contends that faculty resistance to including the new technologies in their teaching coupled with the new consumerism of many students may well produce powerful new competitors for higher education. The information highway can allow corporate giants in the communication, information, and technology fields with great expertise and resources to become real competitors in the higher education market. They can bring to students

wherever they are all of the information and interaction provided by the information highway in ways that could make distance learning and self-paced mastery the rule rather than the exception in higher learning.

This potential threat from powerful competitors comes at the very moment when the federal government is questioning — some would say attacking — the voluntary accreditation system that has protected the monopoly of higher education over the conferral of degrees. The source of this federal initiative goes far beyond the obvious concern over the rising default rates on student loans. The real impetus is a growing sense of public dissatisfaction with the rising cost and declining quality of undergraduate education in colleges and universities. In this environment, our high-tech competitors could claim to offer high-quality education at a much lower cost than our traditional colleges and universities. Our new competition will not be fly-by-night trade schools interested only in collecting student aid, but mergers of the great communication companies with extensive electronic networks and the funds to hire the best educators, to buy the best equipment, and to acquire the best data bases.

The convergence of these four issues — changing career skills, different students, public distrust, and new competitors — poses frightening challenges to higher education. It is time we get scared. Colleges and universities have survived a number of challenges and competitors but this time we may lose out and not make it. The society and students may have a choice of competitors that offer a higher quality product at lower cost.

In the outline of his presentation for SUNY's Conference on Instructional Technologies, William D. Graziadei from the State University College at Platsburgh identifies what I believe is our biggest problem: "... the traditional structures of university teaching and learning create the biggest hurdles. Instructors will have to rethink their assumptions about teaching and students will have to confront their entrenched expectations about classroom learning." To succeed we must convince the faculty not

merely to introduce incrementally more technology into their teaching but to transform the way they teach and the way students learn by the way they use the new information technologies. The goal must be to teach all students better as well as to reach the new type of student that we are increasingly teaching. But before we can deal with student desires, we must respond to faculty resistance.

Three faculty criticisms of infusing instructional technology into their teaching and student learning stand out:

- That technology will depersonalize and dehumanize teaching and learning;
- That technology will diminish the role of faculty; and
- That technology will be used to increase workloads.

A favorite criticism from faculty is that the use of technology will dehumanize teaching and learning. Ironically, the opposite is really true. We can, as the original Megatrends claimed, have both high tech and high touch. Technology, if properly used, can make education more personal to students, because it can be tailored to the individual needs and learning styles of each student. We should also consider whether faculty lecturing at students for an hour three times a week is what one could call a truly personal interaction.

Another criticism from faculty is that technology will reduce their role in teaching. Quite the contrary! Technology can elevate rather than diminish the importance of faculty. It can free faculty to do what they do best — free them from the drudgery of purveying information and data and allow them to convey the meanings and relationships that constitute knowledge and wisdom. They can assist students in acquiring understanding rather than in giving information that students can get more easily electronically on their own time — in their own home. Faculty will be free at last to reach for the heights to which higher education has long aspired.

Faculty will have a different — but a better not a lesser — role. In an age when information doubles every half decade, they can teach students not information but how to acquire, analyze, and synthesize what they gather. Faculty can have the time to mentor students, to deal with their differences, and to help them become fellow learners. Most important of all, technology can help to end once and for all the conflict between teaching and research by recognizing that both teaching and research depend on discovery and not the delivery of data and information.

Again, Bill Graziadei says this well in the abstract of his presentation at SUNY's Instructional Technologies Conference:

> *"To achieve a true 'understanding' in learning one must examine, question, and explore. Hence, one of the most important aims in education is to introduce the student to the process of inquiry. K-12 and higher education must undergo its most significant changes in the next decade if we are to regain and surpass the stature we once had worldwide. We are not producing critical, independent scholars, and problem-solvers today in anything like the numbers our disciplines and our society need. Is this because we are not preaching what we practice, not teaching students to do what we do but only trying to teach them what we know?"*

I am reminded of Ernest L. Boyer's notion that we must view teaching as the "scholarship of pedagogy" — a task no less noble and not greatly different from research, since both require rigorous methodology in the discovery of knowledge and high standards in the manner of its dissemination. Educational technology can free faculty to teach students the science and the art of investigation and problem solving, which are just as essential to teaching and learning as they are to research and discovery. Indeed, technology can free faculty from the burden of covering the material and allow them to help students learn the delight of discovering new knowledge and novel ways of addressing old problems.

Finally, faculty fear that the transformation of teaching and learning through information technology will be used to diminish their numbers and their compensation because of the reduced importance of the traditional lecture. Again the opposite is true. Surely faculty realize that the silly system of measuring their contribution to instruction by counting their classroom contact hours trivializes their teaching and demeans their profession. The current system is grossly unfair, for it gives faculty no credit for their contributions to student learning through advising, counseling, mentoring, and collaborating. Yet these activities are actually those that are most valued by students — by all students — the well-prepared as well as the underprepared. They are also the activities that will become even more important to students in the future, when they can get their information easier and quicker at home than on campus. It is precisely these higher-order faculty contributions that increasingly provide the "value added" that will give colleges and universities their real edge in the contest for students, especially against competitors from outside academia.

The value of faculty will increase, as they lecture less and mentor more. Technology need not reduce faculty numbers or their value to higher education. Indeed, it can have the opposite effect if faculty infuse information technology into their teaching and assume the mentoring role that students both demand and need. Presently, we count only faculty contact with students, not their contribution to learning. Worst of all, the current system makes teaching look easy and undemanding, especially in comparison with research. It measures faculty teaching and student learning by a time clock as though it were unskilled labor.

Information technology will bring both change and opportunity to academia. Faculty will teach not more but differently. Students will hear fewer lectures, while taking more responsibility for their own learning. They will have to learn how to learn for themselves, for they will have to continue learning for the

rest of their lives if they want to have meaningful lives and careers. Technology can help us link access and excellence by allowing us to tailor learning to the diverse learning needs and styles of our students without lowering standards to satisfy that mythical average student, which shortchanges both the brightest and the underprepared students. It will allow us to respond to our critics by containing costs while improving quality. But most of all it can confound our potential competitors by freeing our best asset — our faculty — to do what they do best — to perform the higher role that they desire and students demand.

In information technologies our campuses are stuck in many ways in the Middle Ages. Like the missionaries of old we must carry not only new knowledge but a new creed to doubters and dissenters — to the unconvinced and the unbelievers. Unlike the missionaries of yore we must work, not abroad, but at home on our own campuses. Incrementalism, the favored course on our campuses, will no longer work. We need nothing less than a conversion of faculty teaching and student learning.

Unlike those missionaries who had centuries for their work, I fear our time is short. If there is one certainty in the future of technology, it is not just change — but change at ever-accelerating speeds. One problem with the academy is that we always seem to think there is time. But this time we may not have time, for the only real victim of technology is time.

But missionaries need money, for faith without funds cannot produce good works. This year, SUNY System Administration will propose to the Board of Trustees and to the Governor and the Legislature a multi-year budget request for both the State-operated campuses and community colleges for educational technology. The goal is to provide New York State with the educated work force it needs to succeed in a competitive global economy driven by technology and information. The initiative promises to produce graduates at the associate and baccalaureate level who have the knowledge and skills to access, analyze, and apply information drawn from the full range of electronic

networks. It offers training for faculty to enable them to teach this knowledge and these skills and to infuse technology into their classrooms and teaching techniques. Finally, the initiative seeks to provide the technological infrastructure to support a transformation in teaching and learning on all SUNY campuses.

The revolution in information transfer confronts SUNY with a new challenge and choice. The System and its campuses must choose now whether to follow the old byway or the superhighway in instructional technology. The latter is the fast lane to the future; the former, a pathway from the past.

SEPTEMBER 1994

The Revolution in Electronic Technology and the Modern University: The Convergence of Means

❖ James W. Hall

❖ Convocation

A fundamental change in the conceptual structure of the traditional university is now apparent. Because many of our assumptions about the purpose and structure of distance education are rooted in fixed assumptions about the traditional university, it is useful to focus upon the university as it has existed for several centuries. During that time, the prevailing structural assumptions about the traditional university were developed through experience, adversity, and opportunity. Today, those very assumptions are being challenged everywhere, faster in some places than in others, but surely and steadily throughout the world.

Few will disagree that technology, having radically altered the way manufacturing and business are conducted, is at last changing the way the university functions as an institution of higher learning. But, aside from the automation of formerly tedious processes, few observers recognize in the university the same structure-shattering technological changes that have already transformed the way business is done in many others sectors of society. The meaning and extent of technologically induced transformation can best be understood if one thinks about the organizing concept of the university itself. A changing organizing concept of the traditional university will soon alter this contextual frame of reference so completely that distance educators ignore it at high peril.

For nearly a millennium, the organizing concept of the university could best be described by the word convocation. Beset

in its earliest manifestation by an often barbaric and intrusive world, and fearful that, in a moment's time, the knowledge and wisdom passed down from generation to generation, recorded painstakingly in precious, hand-lettered parchment manuscripts, could be suddenly and irrationally erased from the human record, the university has always organized for defense. Small pockets of scholars, huddled together within moated or cloistered, even fortified, walls, blossomed, over time, into a fortuitous "calling together" of the finest minds, the most precocious students, the distinguished collections of monographs, texts, serials, and artifacts that came to be libraries or bibliotheks, and the study spaces, commons, laboratories, and lecture halls that both scholars and students cohabited.

This convocation of academic people, scholarly things, and convening places constitutes what we have traditionally thought of as the university. For this traditional university, the controlling concept has been to bring together, to convene in a single place, for all time, for the select few who could use them, these resources of scholars, students, books, and facilities. We celebrate even today this concept through a symbolic university ceremony of convocation at the start of each academic year.

For example, the State University of New York, in the short space of forty-five years, has constructed a major university system, based on the concept of convocation. Today it is a leading, exemplary example of a large, multi-campus, public university system. Over $5 billion has been expended on building SUNY's campuses; its libraries hold in excess of 35 million items; and over 30,000 faculty members are associated with the academic departments. Today, its annual operating budget exceeds $2.5 billion. In the past twenty-five years, similar huge investments in the traditional university structure have occurred throughout the world.

As an organizing concept, convocation has been powerful and pervasive. We appraise the quality of a university on the basis of how much academic wealth it convenes. What does a

university own outright, manage, support, and preserve? The more world-class the professors, the higher the intellectual profile of matriculated students, the grander and rarer the library holdings, and the finer the instrumentation in the laboratories, then the more generous the appraisal and, hence, the more prestigious the reputation of a particular university.

But throughout history, these attributes of university excellence have been in short supply. As long as universities have functioned, there has been a shortage of the best minds, a scarcity of the necessary books for these minds to use. The scarcer the item, the more prestigious to have it. Those institutions that could call together more of these scarce commodities than their rivals were appraised as best. Sometimes universities have even engaged in an intellectual shell game, drawing precious scholars from around the world to the highest university bidders.

In fact, all of the university's traditions and practices assume that scarcity is the controlling condition of educational opportunity. As a result, the opportunity for students to pursue a university education must be rationed, parceled out, limited to those most qualified to benefit from it. To a remarkable extent, this sense of scarcity drives the assumptions and understandings about what university learning is and should be. Consequently, convocation is not only a "calling together" of academic wealth, but it implies, as well, conditions of scarcity. Convocation and scarcity are structural Gemini.

The scarcity of first-quality scholars and first rate resources has fostered a sense of exclusivity among those who guard the gate. In the United States, when President Franklin Roosevelt proposed opening universities to returning World War II veterans, Robert Maynard Hutchins of the University of Chicago said that the university would be admitting "intellectual hoboes." Too often, the most critical qualitative measure of a university's excellence is how few of its student applicants can become matriculants and the relative achievement profile of each year's

entering class in comparison to that of an institution's closest competitors.

In these ways, convocation describes the university as it has been known in the past: calling together the scarce elements of intellectual excellence, promoting possessiveness and exclusivity. Through convocation, this traditional university guards its gates in ways not fundamentally dissimilar from the ways that nations have guarded their borders. Indeed, today's rivalries on the athletic field give physical reality to the more cerebral, intellectual competition behind the ivy-covered walls of academe.

Gradually, over the past century, the university of convocation has sought ways to lessen the problems of scarcity. It has attempted in many ingenious ways to open its doors to more students. The primary responses to student demand have been to increase the number of campuses and size of the institution. Within SUNY, thirty two-year community colleges, that offer essentially open admissions to close-to-home students, have lessened the pressures for places that might otherwise descend on the baccalaureate level institutions. These colleges have also helped to keep the costs of an associate degree relatively low, and so accessible to more people. But these responses, valuable as they have been in responding to democratic demands for enrollment, have increased the qualities of excellence only at the margin.

In fact, one of the most critical debates over the years has been with regard to the importance of size in the university. Many years ago, a college or university of relatively small size was considered highly desirable. But when the numbers of students seeking entrance to a university education increased exponentially following World War II, very large institutions became the norm. Not only could these rapidly expanding, often publicly supported "Land-Grant" giants bring together vast troves of educational resources, they could also pay the biggest academic salaries, attract the most renowned scholars, and maintain the most extensive collections of bibliographic resources,

especially scholarly journals. Most remarkably, they could do all of this and yet remain surprisingly cost-efficient. Sheer size of the student body made it possible to support the widest range of curricula and post-baccalaureate programs through the doctorate in every imaginable field of study (not to mention a complex of highly competitive athletic teams!). For several entire academic generations, size of student enrollment was usually considered a positive value. The institutional behemoths of the American Midwest are testimony to this massive effort to respond to democratically inspired student demand.

In the United States, even increasing the size of single institutions could not fulfill the demand. Within the boundaries of the states, many individual institutions were forged together into enormous university systems, creating mega universities of prodigious size and academic scope. During the 1960's, for example, the State University of New York became a system of 72 physically separate campuses, headed by a single, governing Board of Trustees and administered by a Chancellor. (The system was later reduced to 64 campuses following transfer of eight New York City community colleges to the City University of New York). Today, its total student enrollment is 400,000 students. Comparable conglomerates were fused in California, with its three very large systems, and in many other American states. More recently, this same phenomenon has been experienced elsewhere across the world as burgeoning demand for postsecondary access has occurred in political democracies. Recently, Patrick Callan, Executive Director of the California Higher Education Policy Center, referred to these large centralized and hierarchical systems as "characteristics of a passing industrial age." And just as technology has caused the passing of the industrial age, so technology challenges convocation as an organizing concept of the university.

❖ Distance Education and the Traditional University

In this climate of high demand and university scarcity, many nations of the world have created new distance learning institu-

tions. Conceptually, distance learning aimed to extend access to those many students, including those bypassed at an earlier stage of life, who could not gain entrance to a university campus. In the United States, distance learning programs appear to have been a legitimate response to the needs of many part-time and working adult students who could not travel easily or regularly to a campus. Indeed, these are the "traditional" distance learning students, and the evidence of widespread success with such students is recorded in a number of published research studies.

Distance education, of course, is one of the most significant ways that the traditional university has sought to respond to scarcity. Distance education is, first and foremost, a movement that sought not so much to challenge or change the structure of higher learning, but a movement to extend the traditional university, a movement to overcome its generic problems of scarcity and exclusivity.

In this sense, "distance education" is a phrase that can be understood only in reference to the university of convocation. Distance education is distance from the classroom, distance from sitting at the foot of the professor, and distance from the physical campus. The history of distance education is familiar enough that it needs no further rehearsal here. It is sufficient to this argument to stress that distance education developed as a creative political response to the increasing inability of the traditional university structure to grow bigger. Distance education dealt with the downside of size; i.e., too many students in a single physical space. As such, institutions that feature distance teaching have filled an important niche unserved and, in the past, largely unwanted by the traditional university. The university would, in effect, reach out, offering not seats, but the opportunity to learn. Distance education developed when Convocation, as an organizing concept for the university, had reached its natural limits — limits in size, and limits in resources.

But distance education has itself suffered from shortcomings and scarcities that have made it difficult to operate, expensive to develop, and occasionally difficult to validate. All distance learning institutions have had to grapple with three fundamental problems.

One problem is the continuing cost and quality of communications. Whether the postal strike that greeted the inaugural of the British Open University, or the absence of reliable telephone services, distance learning is bedeviled by unreliable communications infrastructures. In the most advanced nations, usually reliable voice, data, and postal communications are often less than ideal for student-friendly, teacher to student interactions. In underdeveloped nations, even the simplest of telecommunications systems is frequently inoperable or absent altogether. Distance education has long suffered from the inadequacy of the infrastructure.

A second problem is how to maintain sufficient student contact and ongoing interaction with those who provide intellectual guidance, timely assistance when needed, and adequate performance feedback. Although distance learning courses overcome the scarcity of faculty instructional time experienced by the traditional university, the problem of adequate student/faculty engagement remains. Specialists have expended a lot of time and effort in attempting to devise ingenious solutions to this problem. But beyond an occasional telephone call to a student, an office visit at a study center, or the written response to assignments, the lack of timely and frequent student to faculty interaction is one of the most difficult of problems to overcome.

A third problem is the availability of adequate resources, beyond the required texts, for extended student exploration and research. Distance courses are limited by the high cost and space limitations of set texts. In resource rich nations, students do have the option of using the local library; in most of the world, library books are inaccessible and scarce. But even where libraries are relatively accessible, shortages of book

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copies, of available staff, and limited hours of operation that are convenient to distance students pose serious handicaps. The lack of adequate resources in distance education, as in traditional campuses, is an unsolved problem.

Practitioners in distance education have rightly looked to technology as the means to address and solve these and other problems. They have been among the first in seeing the promise of the technological revolution as a means to unlock the door to access for students, and to help distance teaching institutions become the leaders of the "new university." This may indeed happen. But there exists another scenario that may be far more plausible.

❖ Convergence

It follows from the argument advanced to this point that the issue for distance educators is not simply how to apply the new technologies to distance education. Rather, one must first consider how technology is redefining the university itself. Technology presents new opportunities not only to distance education. Technology is changing all of learning. Through applications of technology, the traditional university of convocation is about to become the university of convergence.

That this is so is seen in another phenomenon that has begun to appear in the university. Increasingly, students who are enrolled at traditional campuses are using distance courses or course modules. These distance courses or academic modules are used by students in the library, as supplementary parts of classroom-based courses, in residence halls, and even at home.

Distance is rapidly becoming a transparent factor in defining where learning occurs, where instruction originates, or where resources are housed and accessed. As a result, distance learning is beginning to lose its significance as a defining characteristic. Rather, resources for learning emanate from many places, some from a distance, some from close at hand.

The fact is that "distance" is rapidly becoming less important as the key descriptor for courses or students. Perhaps "connected" or "colateral" learning will become a more accurate descriptor. Colateral learning describes the growing availability of aids or alternatives that allow a student to review, speed up or substitute for some or all of what normally occurs in a classroom lecture. Such colateral options are becoming more commonly available, of higher quality, less costly to access, and thereby of much greater importance to every institution.

Because technology changes the meaning and efficacy of "distance," the niche occupied by distance education will become less clear, and certainly less undesirable to the traditional university. In short, the university is in the process of deep structural change, and that change will lead to a new structural concept: the concept of convergence. This change opens new opportunities for "distance learning," but it will also bring the full weight of the traditional university into direct competition with specialized distance learning institutions.

Indeed, the newest technology allows the traditional university to address some of its most critical and fundamental operating assumptions. Through applications of technology, possession, scarcity, and exclusivity, the characteristics of convocation, are replaced by *wide access*, multiplicity, and replicability of resources. Exclusivity gives way to outreach and inclusiveness. Convergence replaces convocation as the organizing concept of the university. As technology makes possible these new and very different conditions, the very structure of higher education is undergoing fundamental change.

One can visualize the university of convergence as a place of vast, perhaps limitless, exchange and interconnection, where research conducted by the most brilliant faculty is shared almost instantly with the relevant scholarly community and with the larger world. The exchange of ideas around the most cutting edge research is immediately available throughout the world's intellectual community. The rarest texts are available within a

short time, and increasing numbers of serials are available electronically the minute they are published. All of these resources will be available to anyone, anywhere, and, within limits, almost without financial restriction. Students in the university of convergence will learn to engage with information, understand how to use it, and gain the skills and intellectual competencies always associated with a university graduate. The faculties of the university of convergence will also take on aspects of the teaching role that have heretofore been less prominent or essential. The role of intellectual guide to the student, or mentor, will become more important as students pursue much of the formal instruction, formerly communicated through faculty lectures, in a variety of self-paced, student directed modes. In fact, student planning and academic advisement is likely to move to the very center of the educational process for both students and faculty, as both seek to find and use the most useful available resources. The traditional university never gave this critical function more than lip service. Most faculty time was committed to direct instruction and research with little time reserved for direct engagement with individual students. The university of convergence will require a dramatic shift of time commitment toward student advisement.

Possession will not be the limiting fact of the university. Because possession is no longer critical to success, scarcity will also no longer be a controlling condition of the university. No longer will it be necessary for the university to aggregate intellectual wealth behind walls originally designed to defend and protect scholars from the assaults of a barbaric external world.

So, although technology offers solutions to the problems and limitations of distance education institutions, technology will also allow the traditional university to address its limitations as well. With technology, the university of convergence will be able to overcome the historic problems that made distance education necessary in the first place. Simply put, it will multiply the number of seats available to students. It will multiply the

heretofore precious resources for learning. Most significantly, it will multiply the capacity for students to review and master knowledge through self-paced, interactive study.

None of this will happen instantly or uniformly. Instruction, the most traditionally organized core function of the university, remains largely untouched by the technology revolution. Joseph C. Burke, Interim Chancellor of SUNY, calls the classroom lecture the element of university instruction most resistant to change. At least in the United States, scarcity is still defined on the university campus by the limited number of seats in the classroom and by the tightly defined classroom hours of instruction. The tyranny of the classroom hour, as noted by Robert Heterick of EDUCOM, is the remaining but nearly insurmountable obstacle to our overcoming the scarcity of instruction. When instruction - redefined as student learning - is unhinged from the classroom hour, the transforming possibilities of educational uses of technology will be complete. This may be more easily accomplished by non-American universities where the classroom and lecture have always been less important as measures of student accomplishment. In any case, when this change comes to on-campus instruction, as it came long ago to distance learning educators, then the application of technology will have changed the organizing concept of the university itself.

How far away is the transformation of the university of convocation to a university of convergence? How many traditional institutions are ready to accommodate such fundamental changes? Are the faculties aware of the implications of these changes? Are they prepared to see their role as lecturer modified?

Until a few years ago, one might have asked similar questions about the permeability of political boundaries, or about the capacity of a dictatorship to control its people. What we have witnessed recently is that technology, in the form of ubiquitous communications, goes where it will. Traditional political controls cannot stop technology. When one organization, through

its dominance or its traditions, resists the use of a breakthrough technology, another organization creates alternatives that compete with existing forms.

Technology will have a comparable effect on the traditional university. Distance learning, which itself has offered a competing form, will also be deeply affected, even as it pioneers in exploring the uses of technology. If the university, in its traditional or distance form, does not adapt to the possibilities of technology, competing structures will surely spring up that can and will perform the tasks of the university.

❖ Testing the Theory in the Context of the State University of New York

Thus far, this has been a rather theoretical exercise in projecting the impact of technology on both the traditional university and on distance education institutions. It may be useful, by way of illustration, to apply these concepts to actual conditions within SUNY. Today, the State University of New York comprises 64 distinct institutions, including medical schools, research centers, comprehensive undergraduate colleges of arts and sciences, colleges of technology, community colleges, and one distance learning institution; viz., Empire State College. SUNY serves a state population of eighteen million persons, scattered from New York City and Long Island in the East, to Buffalo in the West, and to the Canadian border in the North.

In the 1960's, SUNY, in trying to reach out to populations that could not be easily served on a campus, and like many of the large, public universities of the Midwest, offered traditional courses at a distance through correspondence education. SUNY even created a "university of the air," anticipating the use of broadcast television as an instructional medium. In 1971, SUNY established a new statewide institution, Empire State College, to demonstrate new ways to serve the adult, part-time, off-campus student. Empire State was empowered to offer degrees through the MA and to offer instruction throughout the state. Today, Empire State College serves about 10,000 of SUNY's students.

What was unique about SUNY/Empire State College was its focus on non-classroom and distance pedagogies, rather than on the then prevailing technology. (The PC and digital networks were not yet developed.) Beginning to offer instruction about the same time as the Open University in Great Britain, Empire State developed the now familiar processes for which it is best known in the field of distance education: mentoring, contract learning, and assessment of prior learning for advanced standing. Perhaps most interesting, however, is that its experiments were designed to move the entire SUNY system toward improved service to the off-campus or distance student. In this regard, Empire State was neither totally separate (as is the case with many freestanding national open universities), nor totally incorporated (as with so-called "dual-mode" institutions. Its mission established Empire State as an experimenting program for SUNY, but its governance included its own full-time Faculties and President. For the past 23 years, it has been the unchallenged distance learning institution for SUNY and beyond. But today, as the rest of the university system shifts from convocation to convergence, Empire State cannot assume exclusive service to distance students. Like all distance institutions, Empire State needs to develop a new leadership role in meeting student needs.

The State University of New York, as a system, brings special capacities to the task. Its great size and formidable resources are of immense help as it plans for: 1) the essential technology infrastructure; 2) systems for sharing information, library and other resources; 3) instructional course software; and, 4) sharing of distance courses.

The first objective, installing and paying for a statewide information network, seems daunting. But if courses and library resources are to be available to all students, both on the campus (in the library, classroom, or residence hall), and beyond the campus (the industrial work site, the community library, or the student's home), and at convenient, asynchronous times,

then a wide band, high speed electronic network is required to link all 64 campuses to each other and to communications trunks into private homes. Currently, SUNY is testing just such links in three regions of the State. Some of the smaller American states have already installed just such networks. The important point is that all universities will have access to such an infrastructure within two or three years.

Because no single educational institution can afford such an investment from a single annual operating budget, this technology infrastructure will be financed through long term bonded debt. Collaboration with all of public and private higher education and with the public schools, as well as with other large agencies of government, will be essential in building and operating the necessary statewide networks.

Once the network is in place, important library, informational, and instructional applications can be accomplished. Heretofore, SUNY has concentrated on creating the on-campus library software that allows faculty and students to enter distant data bases, reach graphic and information libraries, and explore worldwide bibliographic search sources. Shortly, the libraries will begin to experiment with transmission of full texts of journal articles. In the long run, SUNY anticipates significant savings in the costs of library construction, book cataloguing, and book and periodical storage.

A second objective is to reconceptualize the use of technologies. As a system, SUNY spends $80M annually for telephones, $30M for library book acquisitions and access to data bases, and additional millions for computing and video production. It makes sense to begin to think of all these as parts of a whole. Formerly quite separate operationally, telephones and telecommunications, computing and electronic storage, and instructional technology now converge in planning and operations. There is a convergence of technologies.

A third, and, by all odds, much more difficult objective, is to begin to think of the convergence of instructional modes. Many of SUNY's campuses now express interest in offering courses at a distance, using the satellite, microwave and fiber networks currently under development for system-wide use. Until recently, such interest was unheard of. Now, a number of campuses propose to form regional educational networks, sharing the costs of course development. For example, EngiNet, a new program offered collaboratively by several SUNY Schools of Engineering, will soon provide live graduate level courses in engineering across the state, both at participating campuses and at small business locations.

The health sciences institutions are experimenting with various forms of distance communication as well. The delivery of health care is shifting from inpatient to outpatient, and from acute episodic care to longitudinal lifetime care. This shift encourages patient-centered, home- and community-based services, distributed through large, coordinated electronic networks. Even the health professional education process is moving out of the more traditional academic medical center into distributed, often distant, community settings. In order to deliver high quality, comprehensive care in community settings, providers must be connected by electronic networks which will make patient records, medical data, and professional consultation instantly available wherever services are delivered. SUNY is working to provide the learning resources and medical information networks that are the critical components in making this possible. Perhaps the most intriguing demonstration of this distributed principle will be the SUNY rural health network. Such a health services network will be coordinated by a virtual "medicampus" that will connect full-time instructors from the faculties of nursing, medicine, allied health, and public health. These instructors will practice within the network, and will also provide education for health professions students who are located in rural settings.

So, while SUNY currently has in operation only one full distance degree program, additional already planned programs will emerge in the near future. Can lectures in the classroom, interactive seminars (both live and on-line), distance courses, and student-paced, multimedia course modules be linked in a wholly interchangeable set of instructional opportunities for students? And will the high speed information networks be in place to support these academic programs? Such a convergence of instructional modes and information systems will be the greatest challenge that SUNY has faced.

This challenge is most pronounced in dealing with the problems and issues raised by distance learning. In this area, distance educators are already far ahead. But the traditional university is increasingly active, and SUNY is no exception. Recently, SUNY appointed a Presidents' Commission on Distance Learning. That commission is charged to encourage the development of distance learning across the entire state. It will focus as well on the "nuts and bolts" of distance learning, including such questions as:

1. Can several campuses share the initial high cost of course development? The investment capital required to develop even very short interactive software is very great. Currently, SUNY faculty from several campuses are pooling their expertise and funds to support the creation of new software. Among the most interesting is the development of an environmental sciences "course" that draws upon the expertise of specialists from the College of Environmental Science and Forestry, the Atmospheric Science Research Center, the Earthquake Engineering Center, the Marine Sciences Research Center, and the River Sciences Center. Such a course will be used as an advanced placement study for talented secondary school students in their last year of study, or for first year students studying at a SUNY two-year college. Other examples include the development of a first-year chemistry course, including interactive simulated laboratory studies, and a first course in psychology.

2. Which faculties "own" the degree course? Will it be acceptable for a distance course to be sponsored and credited by multiple academic departments located at separate campuses?

3. How will otherwise competing institutions receive credit for student enrollment and for collected revenue? Since each campus receives its public budget appropriation based upon the number of students it teaches, can new accounting systems be developed to recognize the enrollment of students who work at a distance?

4. How will courses be validated or accredited? Will the imprimatur of a sponsoring academic department be sufficient, as in traditional accreditation, or will alternative measures be needed? Can these costly courses be maintained, updated periodically, so that currency is sustained?

5. How will faculty workload assignments and related contractual issues be determined? Since these are traditionally issues that are regulated by the collective bargaining agreement, involvement of the unions from the outset is an important requirement.

6. Will it be necessary to synchronize the varied institutional academic calendars of each campus? Or will the new software be adaptable to different calendars? In the past, distance courses have required identical start and stop dates to accommodate the marking of assignments and administration of examinations. But this has been a straitjacket, severely limiting the use of such courses by multiple institutions.

7. Can students take courses at multiple universities, compiling a whole degree from the offerings of different faculties? Such a pattern challenges the most fundamental concept of institutional integrity and may be the most difficult question to resolve.

Closely linked to all of these questions is the fourth objective of faculty and staff training and development. Development has risen to the top of urgent matters that need renewed attention.

If major changes are to occur in instruction itself, the faculty will need extensive opportunity to learn to cope with new systems and strange technologies. The established academic culture relies on the traditional lecture, both as a method of conveying to students the latest research and information, and as a strategy for teaching analysis and problem solving. The university of convergence will require different forms of student/faculty interaction, including considerable asynchronous communication. Shifting away from the old pattern will require an extensive cultural change on the part of faculty and administration. Thus far, most opportunities for training have focused on introductory uses of computers - electronic mail, access to InterNet, and access to distant data bases for research. But the new, interactive modes of teaching and learning will require faculty expertise in authoring course modules, manipulating video images in the lecture hall, and conducting complex experiments at a distance. No graduate schools have ever taught these skills to the current faculties of the university. Moreover, few faculty are trained to help students find and use multiple learning resources and instructional aids beyond those normally associated with the classroom. Yet it seems clear that the emerging faculty role will begin to replace the older patterns of teaching through lecture and discussion. The faculty role will shift toward one of its most critical, but underdeveloped, facets — that of mentor or intellectual guide. In similar fashion, the librarian role will shift toward helping students and faculty navigate through a sea of information riches. Both faculty and librarians will focus much more on steering students, one at a time, through customized, often interactive or self-paced learning and research opportunities.

This shift of pedagogy will require training and development that goes far beyond learning how to use Internet or discovering ways to manipulate the newest software authoring system. One must support those capabilities, of course. But the university must also prepare its faculty for a transformed teaching and learning environment.

❖ Conclusion: What is the Future of Distance Education?

What, then, is the future for established distance education, as it has come to be known, when the so-called traditional university is no longer traditional? What will happen to distance education, firmly rooted within the traditional, when convergence, as an organizing principle, replaces convocation? One might deduce, from the analysis thus far, that distance education, as it has been known, has a dim future. Indeed, that might be true, were it not for the distinguished track record of achievement during the past several decades of the now large and prominent existing distance learning institutions, which have a long head start on the traditional university in using multiple pedagogies. That lead will not last, but it will insure, at the least, that distance institutions are in the game. That timing gives distance learning institutions an opportunity to lead the way, themselves becoming universities of convergence.

Collectively, distance educators have great expertise in solving problems associated with education beyond the classroom. This expertise could be applied to help all of higher learning solve the intellectual, developmental, financial, and logistical problems associated with convergence.

Moreover, distance educators can participate in this effort in less isolation than in the past, involved more fully with the intellectual mainstream. Significantly, distance educators will also have access to more financial resources by working with partners who, after all, control most of the resources available for higher learning.

Distance educators can also focus greater attention on comprehensive planning and give attention to often ignored, but essential, research. A great need exists for information on the effectiveness and related costs of distance or connected learning. While a great deal of research has focused somewhat narrowly on comparisons of distance and traditional learning, or upon the logistics associated with older systems of distance

instruction, very little study has examined the new relationships between pedagogies that the new technologies make feasible.

In sum, distance educators need to forge new partnerships with the traditional university, collaborate in creating new systems, academic course software, and supporting networks for information transmission. Such partnerships will hasten the day when the essential new systems to support a university of convergence will be available, not only to distance students, but to *all* students.

Distance administrators can also be a moral force in promoting the uses of technology to support the values of the university, rather than allowing technology to dictate its values. Workers in distance education know what is needed by students who are working on their own, away from the support structures of the campus. There will be lots of opportunity ahead to use this expertise, especially if the university is to prevent opportunists from commandeering the world of the virtual university.

In the end, it will not be its traditional physical trappings, nor its extended distance forms, neither convocation nor convergence, that will guarantee the university's continuing significance to our global society. That significance will be assured by maintaining the central values of the university: viz., helping students to learn and grow intellectually, creating a climate within which scholars can create and test knowledge, and reaching out to enlighten a civilized community. The convergent university, in which all must be full partners, can help achieve that worthy purpose.

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